PeriRDB User's Guide 2.1

Avaya Business Communications Manager

Document Status: **Standard**

Document Number: **P0602814**

Document Version: **1.92**

Date: **June 2010**

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Preface

Scope

The *PeriRDB User's Guide* provides a feature description and reference for PeriSQL and SQLClnt software functions as well as SQL database libraries. This document also includes installation, configuration, and operation information.

This document uses PeriProducer as the application development tool. For information about using PeriProducer, see the *PeriProducer User's Guide*.

Intended Audience

This document is intended for application developers implementing RDBMS applications in an Avaya Media Processing Server (MPS) environment.

To use this document, you should be familiar with relational databases, and structured query languages.

Avaya recommends that application developers attend an on-site PeriProducer class as well as a system familiarization training program before attempting to create interactive applications.

How to Use This Manual

This manual uses many standard terms relating to computer system and software application functions. However, it contains some terminology that can only be explained in the context of the MPS Series system. Refer to the *Glossary of MPS Terminology* for definitions of MPS Series specific terms.

Initially, you should read this manual at least once, from start to finish. Later, you can use the Table of Contents to locate topics of interest for reference and review.

If you are reading this document online, use the cross-reference links (shown in blue) to quickly locate related topics. <LEFT> click once with your mouse while positioned with your cursor over the cross-reference link. Click on any point in a Table of Contents entry to move to that topic. Click on the page number of any Index entry to access that topic page.

To familiarize yourself with various specialized textual references within the manual, , see ***Conventions Used in This Manual*** on page 8.

Periphonics is part of Avaya. The name Periphonics, and variations thereof, appear in this manual only where it is referred to in a product. (For examples, a PeriProducer application, the `PERImps` package, the **`perirev`** command, etc.)

Organization of This Manual

- **Chapter 1: PeriSQL**
  Describes Periphonics' SQL generation and display tool, PeriSQL
- **Chapter 2: SQLClnt**
  Describes Periphonics' RDBMS server request accelerator, SQLClnt
- **Chapter 3: CORBAClnt**
  Describes Periphonics' CORBA server tool, CORBAClnt
- **Chapter 4: PeriRDB Libraries**
  Describes PeriRDB's database libraries

Conventions Used in This Manual

This manual uses different fonts and symbols to differentiate between document elements and types of information. These conventions are summarized in the following table.

Conventions Used in This Manual Sheet 1 of 2

Notation	Description
Normal text	Normal text font is used for most of the document.
important term	The Italics font is used to introduce new terms, to highlight meaningful words or phrases, or to distinguish specific terms from nearby text.
system command	This font indicates a system command and/or its arguments. Such keywords are to be entered exactly as shown (i.e., users are not to fill in their own values).
command, **condition** and **alarm**	Command, Condition and Alarm references appear on the screen in magenta text and reference the *Command Reference Manual*, the *PeriProducer User's Guide*, or the *Alarm Reference Manual*, respectively. Refer to these documents for detailed information about **Commands**, **Conditions**, and **Alarms**.
`file name / directory`	This font is used for highlighting the names of disk directories, files, and extensions for file names. It is also used to show displays on text-based screens (e.g., to show the contents of a file.)
on-screen field	This font is used for field labels, on-screen menu buttons, and action buttons.
<KEY NAME>	A term that appears within angled brackets denotes a terminal keyboard key, a telephone keypad button, or a system mouse button.
Book Reference	This font indicates the names of other publications referenced within the document.
cross reference	A cross reference appears on the screen in blue text. Click on the cross reference to access the referenced location. A cross reference that refers to a section name accesses the first page of that section.
	The Note icon identifies notes, important facts, and other keys to understanding.
	The Caution icon identifies procedures or events that require special attention. The icon indicates a warning that serious problems may arise if the stated instructions are improperly followed.

Conventions Used in This Manual Sheet 2 of 2

Notation	Description
	The flying Window icon identifies procedures or events that apply to the Windows 2000 operating system only.[1]
	The Solaris icon identifies procedures or events that apply to the Solaris operating system only.[2]

1. Windows 2000 and the flying Window logo are either trademarks or registered trademarks of the Microsoft Corporation.
2. Solaris is a trademark or registered trademark of Sun Microsystems, Inc. in the United States and other countries.

Solaris and Windows 2000 Conventions

This manual depicts examples (command line syntax, configuration files, and screen shots) in Solaris format. In certain instances Windows 2000 specific commands, procedures, or screen shots are shown where required. The following table lists examples of general operating system conventions to keep in mind when using this manual with either the Solaris or 2000 operating system.

	Solaris	Windows 2000
Environment	`$MPSHOME`	`%MPSHOME%`
Paths	`$MPSHOME/common/etc`	`%MPSHOME%\common\etc`
Command	**`<command> &`**	**`start /b <command>`**

Trademark Conventions

The following trademark information is presented here and applies throughout for third party products discussed within this manual. Trademarking information is not repeated hereafter.

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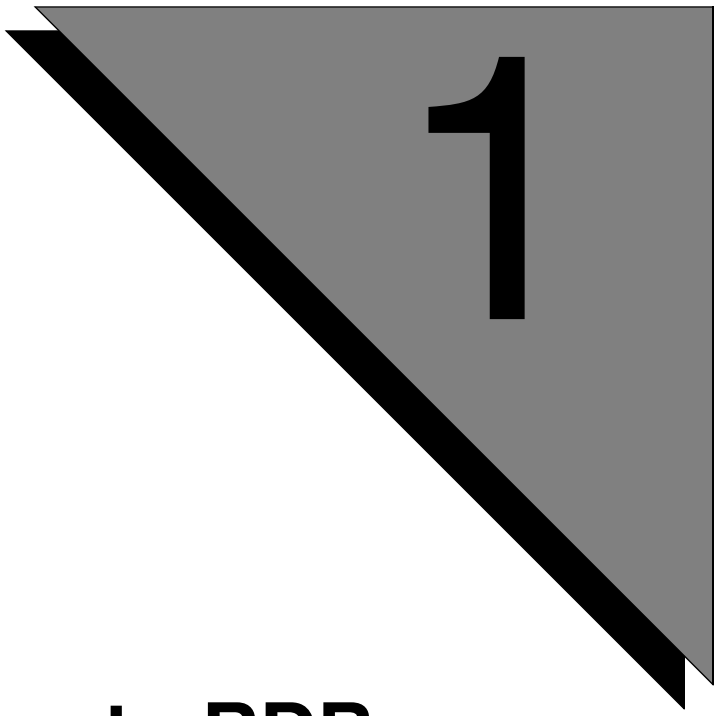


Introduction to RDB Access

This chapter covers:

1. **Overview**
2. **Using the RDB package**
3. **Supported RDBM Systems**

Overview

Relational Database Management Systems (RDBMS) Database access is enabled through the MPS Relational Database (RDB) collection of programs and libraries.

MPS RDB Programs

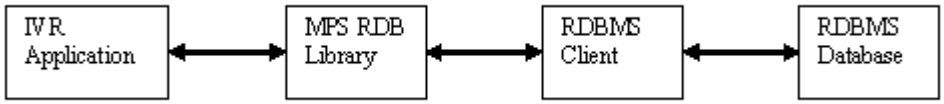
Program type	Description
MPS SQL	GUI utility to access an RDBMS, build and perform Structured Query Language (SQL) commands and display results. It can be launched as a stand-alone application or from within the SQL block in MPS Developer for application development.
SQLClnt	Program to accelerate access to an RDBMS. Used in conjunction with PERIQ.
Cryptutil	Encryption program used to encrypt access strings. These access strings are used by SQLClnt during logon.
CORBAClnt	Program to access Common Object Request Broker Architecture (CORBA) servers

There are three types of MPS RDB Libraries:

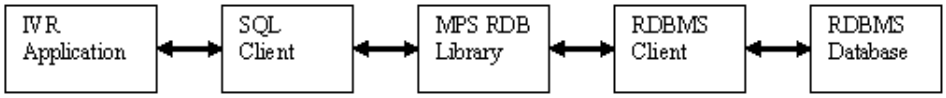
« MPS RDB
« SQL Client
« MPS SQL

MPS RDB Libraries are used by three types of applications based on the kind of connection to the database:

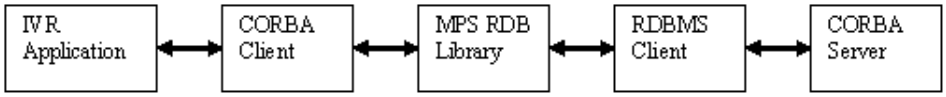
1. applications making direct (native) connections to relational databases



2. applications using SQL Client (SQLClnt)



3. applications using CORBA Client (CORBAClnt)



Using the RDB package

1. Write an Interactive Voice Response (IVR) application using MPS Developer.
2. Include SQL blocks in the IVR application.
   a. Type SQL commands into the block or use MPS SQL.
   b. Specify native, SQL Client, or CORBA Client connections in each block.
3. When you run the IVR application, each SQL block formulates SQL commands.
4. If the application uses a client connection, the SQL commands are sent to either the SQL Client or CORBA Client. (This step is omitted if the application uses a native connection.)
5. The SQL commands are sent to a program/library that is part of MPS RDB.
6. The RDB program/library forwards the SQL commands to the RDBMS Client.
7. If the application uses native or SQL Client connections, the RDBMS Client sends the SQL commands to the RDBMS database. If the application uses CORBA Client connections, the RDBMS Client sends the SQL commands to the CORBA Server.
8. The results from the RDBMS Database (or CORBA Server) are sent back to the IVR application in reverse order.

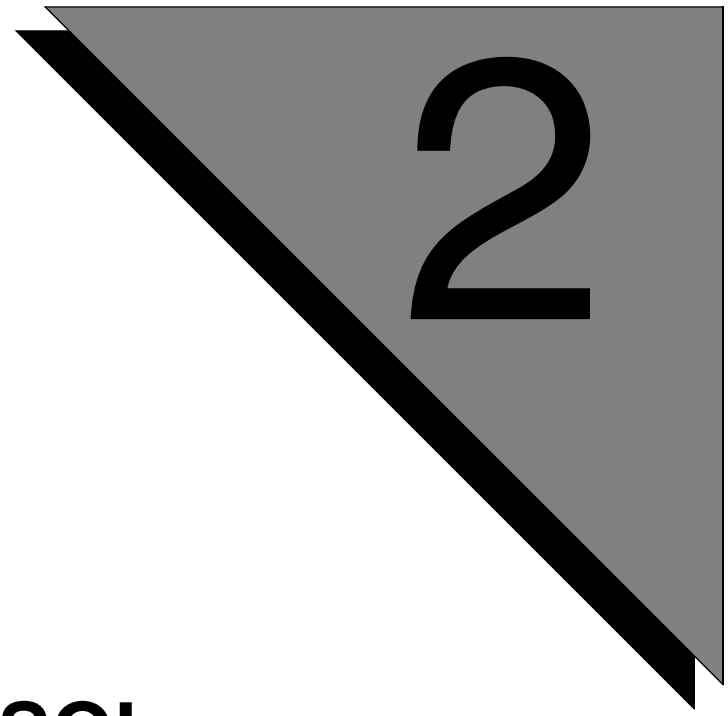
Supported RDBM Systems

The following tables show supported connection types for third-party relational database systems.

Connection type	Oracle	Sybase	Informix	MS SQL	DB2
Native	Oracle 8i (1), 9i, 10g (2)	Sybase 10.x, 11.x, 12.1	IDS 7.31, 9.21, 9.30, 9.40		DB2 7.x, 8.1
ODBC				Connect ODBC 4.2. For MS SQL Server 7.0, 2000, use Connect 5.0	

Connection type	Oracle	Sybase	Informix	MS SQL	DB2
Native	Oracle 8i(1). Up to patch rdb2.0.8; use ODBC for higher patch levels	Sybase 10.x, 11.x, 12.1	IDS 7.31, 9.21, 9.30, 9.40	MS SQL Server 6.5, 7.0, 2000	DB2 7.x, 8.1
ODBC	MS ODBC or Oracle ODBC 9i, 10g. From patch rdb2.0.9 or higher				

1. Oracle 8i is not supported by the vendor since December 2004.
2. Access to Oracle 10g requires Oracle 9i client.



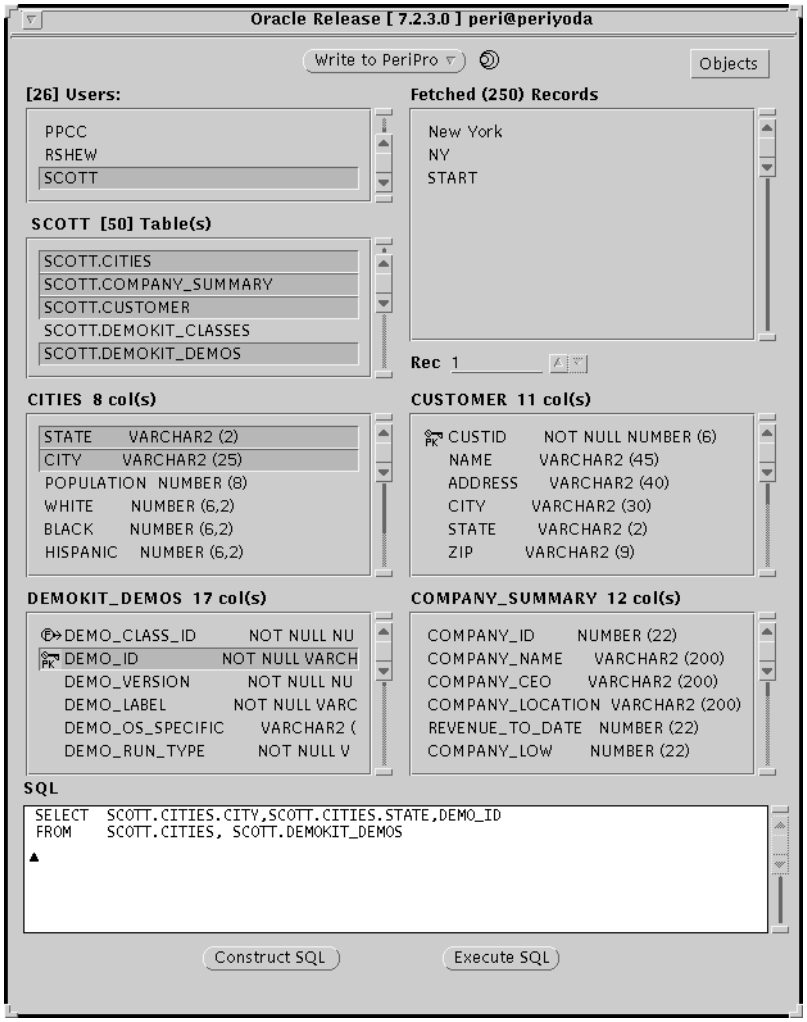
PeriSQL

This chapter covers:

1. **Automatically Generating SQL Commands (PeriSQL)**
2. **Accessing PeriSQL**
3. **PeriSQL Display**
4. **Using PeriSQL to Query an RDBMS**
5. **Using Stored Procedures, Functions, and Triggers**
6. **Using PeriSQL With the SQL Block**

Automatically Generating SQL Commands (PeriSQL)

The Periphonics SQL Generate and Display Tool (PeriSQL) allows you to create, modify, and execute Structured Query Language (SQL) SELECT commands through a graphical interface.



PeriSQL uses the relational database management system (RDBMS) server's master data dictionary to query, retrieve, and display information about the various database objects.

You can also use PeriSQL to access stored Procedures, Functions, and Triggers (see ***Using Stored Procedures, Functions, and Triggers*** on page 28).

You can use PeriSQL as a stand-alone utility (see ***Accessing PeriSQL From the Command Line*** on page 18) or with the PeriProducer SQL block (see ***Accessing PeriSQL From PeriProducer*** on page 19).

References to PeriProducer's SQL block are used throughout this section. For detailed information about the SQL block, refer to the PeriProducer User's Guide.

Accessing PeriSQL

You can access PeriSQL as a stand-alone utility or through the PeriProducer SQL block.

Setting the Environment Variables

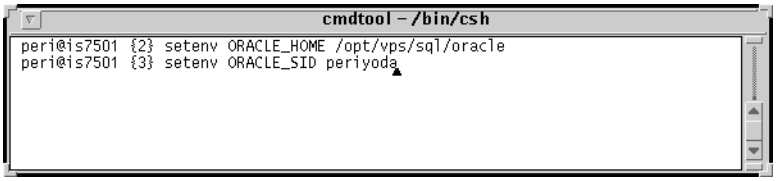
Before PeriSQL can access the RDBMS, you must set the required environment variables for the particular RDBMS.

Normally, the required environment variables are established during the installation of the PeriRDB package.

To access Oracle, set the following Oracle-specific environment variables:

variable name	defines
ORACLE_HOME	the base directory for the Oracle installation
ORACLE_SID	an alias for the Oracle SID (server name) This alias must be properly defined in the `$ORACLE_HOME/network/admin/tnsnames.ora` file to refer to a valid Oracle server instance (SID)

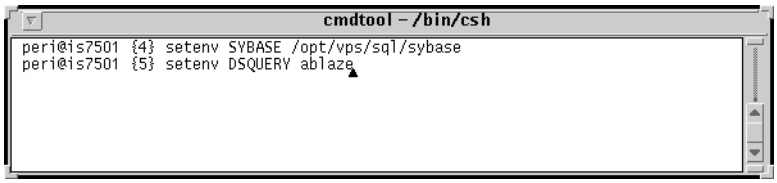
For example:



To access Sybase, set the following Sybase-specific environment variables:

variable name	defines
SYBASE	the base directory for the Sybase installation
DSQUERY	the name of the Sybase server DSQUERY must be properly defined in the `$SYBASE/interfaces` file for a valid Sybase server.

For example:

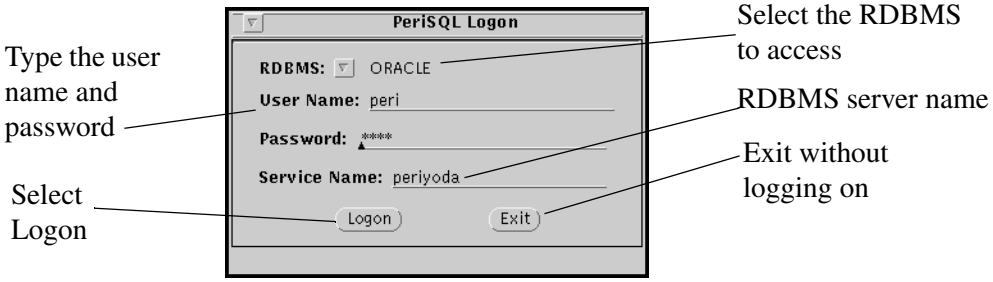


Accessing PeriSQL From the Command Line

Access PeriSQL from the command line by entering the following command:

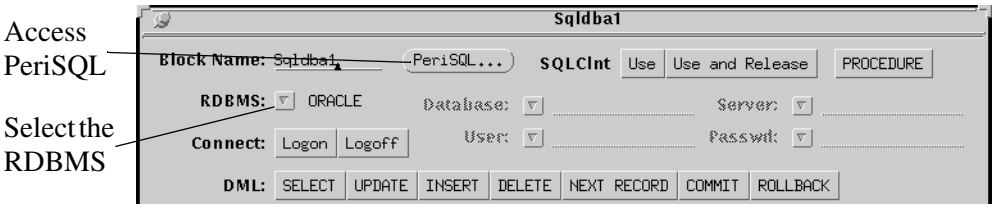
```
perisql &
```

PeriSQL displays the Logon window:

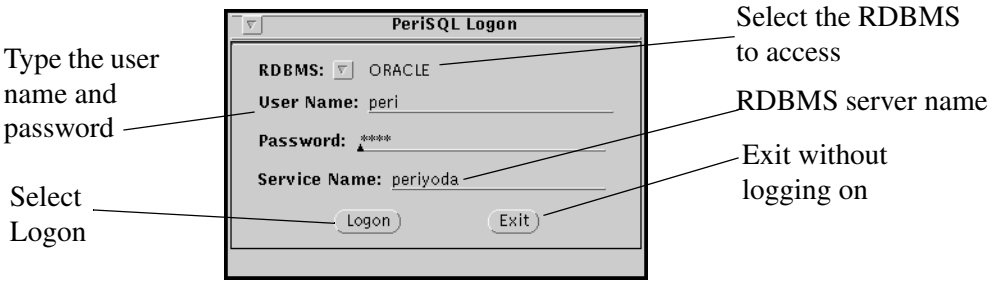


Accessing PeriSQL From PeriProducer

Use an SQL block to access PeriSQL from PeriProducer. From an SQL block action window, select PeriSQL.



PeriSQL displays the Logon window:



When you run PeriSQL from PeriProducer, you can write an SQL SELECT statement (query) directly from PeriSQL into a PeriProducer SQL block's action window. For additional information, see ***Using PeriSQL With the SQL Block*** on page 36.

If PeriSQL is initiated from PeriPro, then exiting PeriPro also exits PeriSQL.

PeriSQL Display

PeriSQL runs in its own window. The display changes dynamically, displaying and labeling scrolling lists based on your selections. The following items appear in every PeriSQL window (Inquiry window):

Standard PeriSQL window items

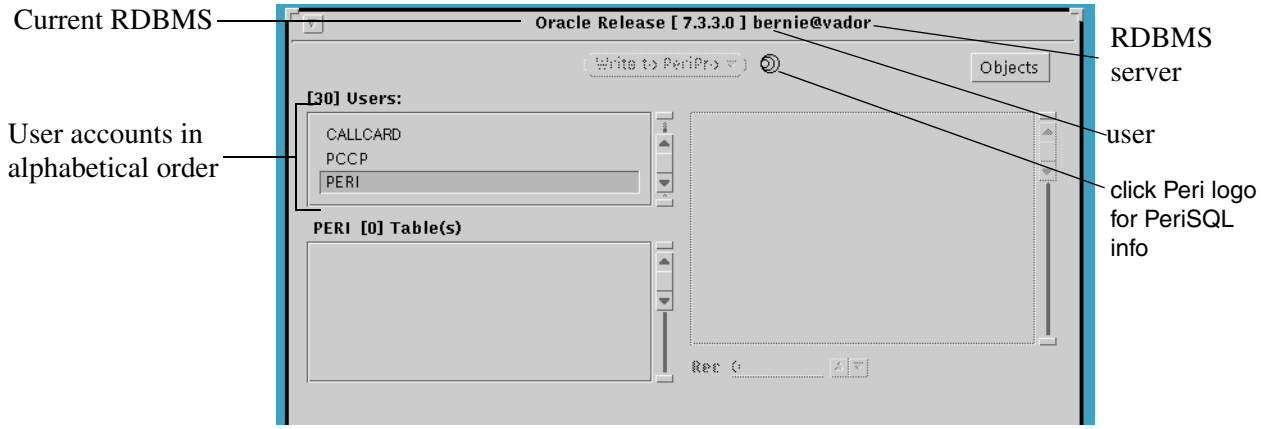
Peri logo	Clicking the Periphonics logo in the heading of the PeriSQL Inquiry window, displays an "About" window containing PeriSQL copyright and version information.
Write to PeriPro[1]	Copies the current SQL command statement to the selected SQL block. PeriSQL can write the SQL command to any open SQL block window that has SELECT as its DML type. For additional information, see ***Using PeriSQL With the SQL Block*** on page 36.
Objects	Signals PeriSQL to display any predefined Procedures, Functions or Triggers when you select a user/database. For additional information, see ***Using Stored Procedures, Functions, and Triggers*** on page 28.
Users[2]/Databases[3]	Displays information about the RDBMS server user accounts/databases that have been defined. When you click a user account/database name, PeriSQL displays the names of all tables owned by that user/account. See ***PeriSQL User Accounts*** on page 21.
Fetched (#) Records	Displays the record(s) retrieved from a successful query. # is the number of records that satisfied the query. An entry in the scrolling list corresponds to a column from the SQL SELECT list, for the currently displayed record.
Rec	The current record number. PeriSQL displays only one record at a time. Use this field to display a specific record from the returned record set.
SQL	Displays the SQL command.
Construct SQL	Creates the SQL SELECT command based on the selected columns and tables, and displays it in the SQL scrolling list box.
Execute SQL	Executes the current SQL SELECT command. Select Execute SQL to perform the query on the database.

1. Write to PeriPro is only enabled if you access PeriSQL from PeriProducer.
2. Oracle
3. Sybase

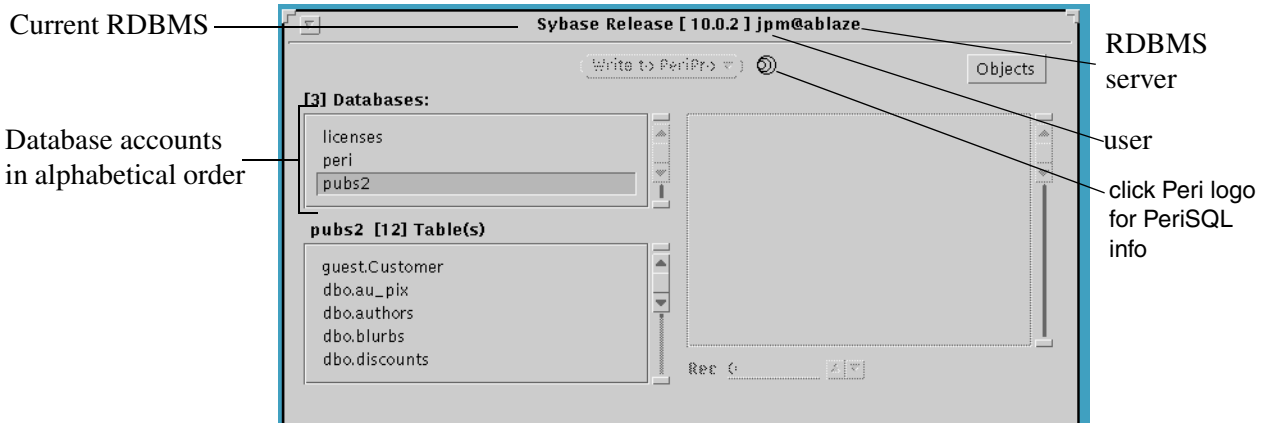
PeriSQL User Accounts

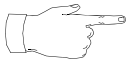
At startup, PeriSQL displays the user/database accounts scrolling list. This list contains the user accounts that are defined for the RDBMS.

ORACLE



SYBASE

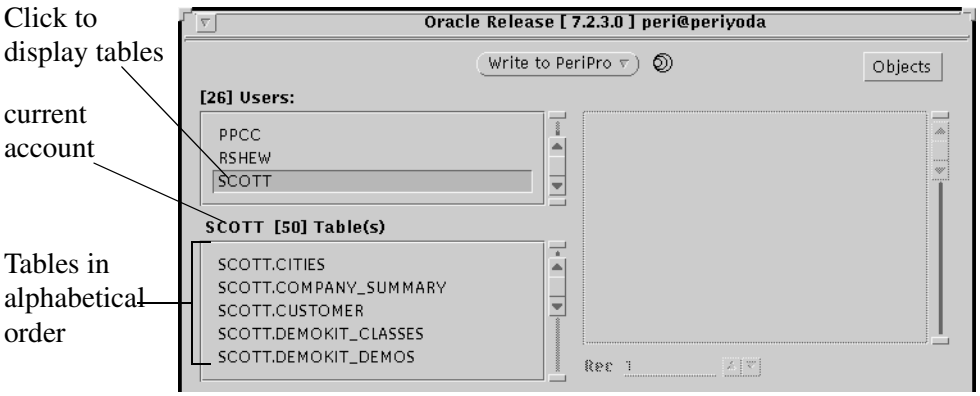




A user account is not a physical structure in the database; rather, users own the database objects.

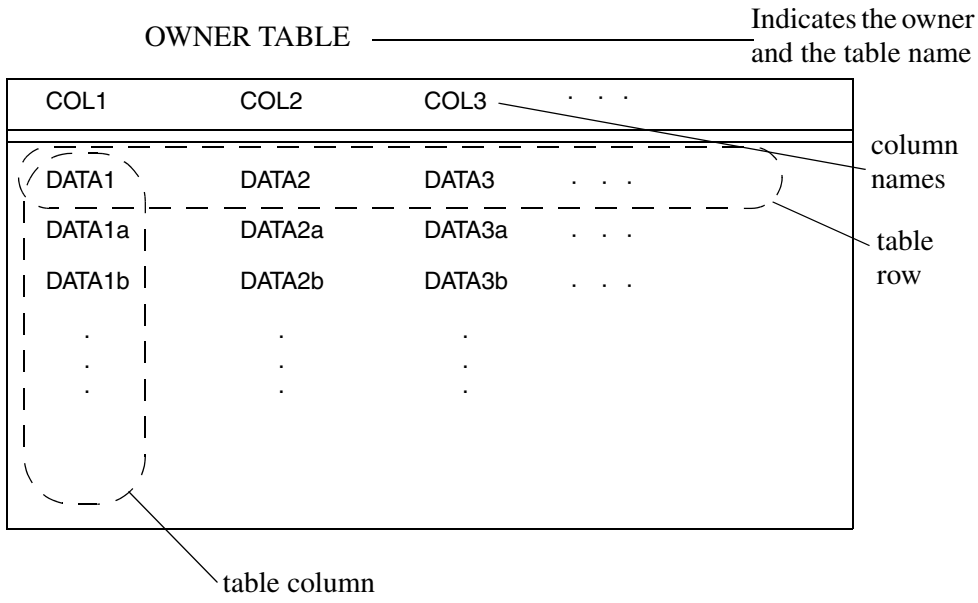
PeriSQL Tables

When you select a user account name, PeriSQL displays that user's set of table names in a scrolling list below the user accounts list. The title of the scrolling list identifies the current user account.



This list contains the names of all the tables owned by the selected user.

Tables are the storage mechanism for data within a relational database system. Tables are made up of rows and columns. Each table in the RDBMS has an owner and a name.



- Each column contains the same type of data (for example, employee numbers). See ***PeriSQL Columns*** on page 23.

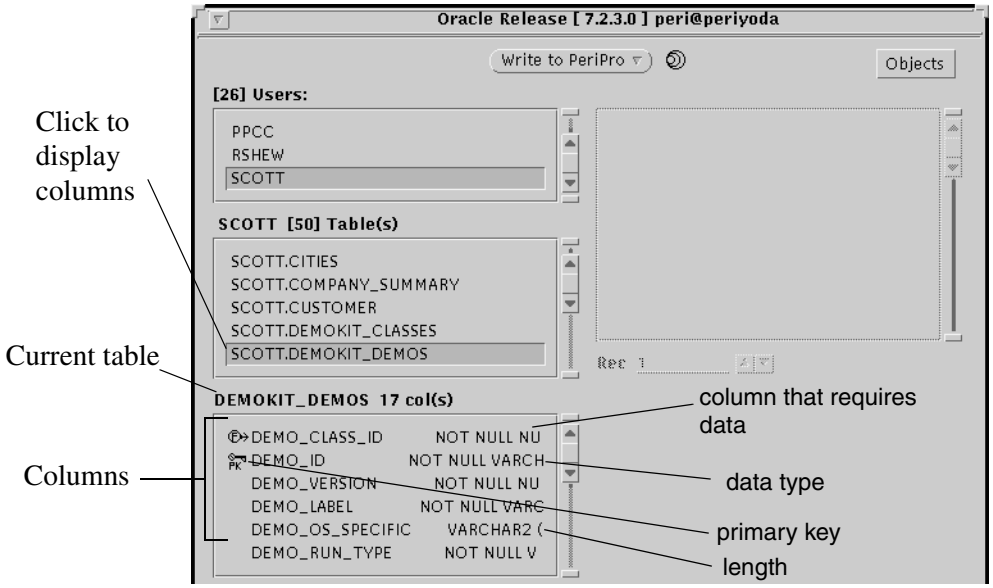
- Each row contains data for a common thread (for example, various data for a single employee). Rows (records) in an RDBMS are in no specific order.

You can display tables for only one user at a time. When you click a different user name, PeriSQL:

- removes the tables for the previous user from the display
- writes the new user's tables to the scrolling list
- titles the scrolling list with the new account name

PeriSQL Columns

When you select a table, PeriSQL displays the set of columns for that table below the table objects list. The title of the scrolling list identifies the selected table.



You can display the columns for up to four tables at one time; PeriSQL labels each list with the appropriate table name. Each list contains a fixed set of columns.

- Select a column to include it in the SQL command.
- You can select multiple columns from one or more of the displayed tables.
- To deselect a column, click it again.

The columns of a table describe the attributes of the data residing in the table. Each column has a name and specific characteristics.

Column Characteristics

Data Type and Length

Each column has at least two characteristics: its data type and its length.

Character	Meaning
data type	Each RDBMS uses a different naming convention to describe the data type. For example, with an Oracle RDBMS, data type can be: *CHAR*. An alphanumeric string with maximum length 255 *DATE*. Year, month, day, hour, seconds *LONG RAW*. A byte string with fixed length 65535 *LONG*. An alphanumeric string with fixed length 65535 *RAW*. A byte string with maximum length 255 *VARCHAR2*. An alphanumeric string with maximum length 255 *NUMBER*. Decimal value
length	The longest item that can be stored in the column.

If the column has the NUMBER data type, it can have the additional characteristics of precision and scale.

Character	Meaning
precision	Determines the number of significant digits in the numeric value.
scale	Determines the placement of the decimal point.

For example, a column with characteristics NUMBER (9,2) has a total of nine digits, two of which are to the right of the decimal point.

NOT NULL (Oracle) and null (Sybase)

For an Oracle RDBMS, SQL uses "NOT NULL" to indicate a column that must be filled with a value in every row—that is, NULL or no value *is not* a valid entry.

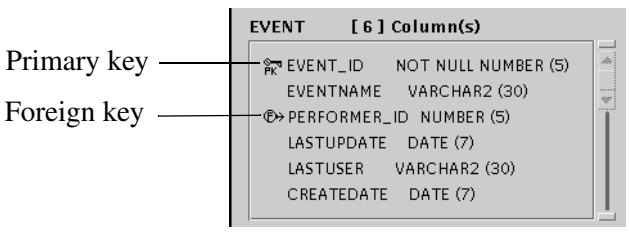
For a Sybase RDBMS, SQL uses "null" to indicate a column where NULL or no value *is* a valid entry.

Key Type

The table definition can include columns designated as primary or foreign keys:

- a primary key is a column that uniquely identifies each row in the table
- a foreign key is a column that is a primary key in another table

PeriSQL displays these columns marked by distinctive glyphs:



Using PeriSQL to Query an RDBMS

Perform the following steps to create an SQL SELECT command and query the RDBMS. See the appropriate section for details about each step. For information about accessing PeriSQL, see page 17.

How to ...Use PeriSQL to Query an RDBMS

1. **From the Users/Databases list, select a user account name**. PeriSQL displays a list of all tables owned by that user. See page 21.
2. **From the list of tables, select the table name(s)**. You can display from one to four tables at a time. PeriSQL displays each table's columns and attributes. See page 22.
3. **From each table's columns list, select the column(s) you want to include in the SQL command**. You can select multiple columns from one or more displayed tables. See page 23.
4. **Select Construct SQL**. PeriSQL writes the SQL command text to the SQL scrolling list box. You can customize the SQL command. See page 25.
5. **Select Execute SQL**. PeriSQL performs the current query and displays the first retrieved record (if any) in the Fetched Records list. See page 27.

To display other records from the query, either enter the record number in the Rec field or use the up and down arrows to scroll to the desired number.

Creating and Customizing the SQL Command in PeriSQL

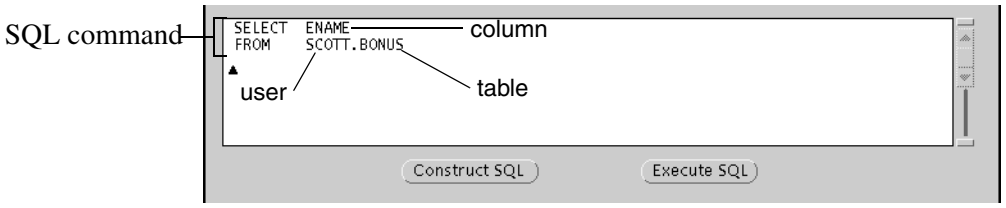
To create an SQL command, you must select at least three pieces of information from the scrolling lists:

- a user/database name (see ***PeriSQL User Accounts*** on page 21)
- a table name (see ***PeriSQL Tables*** on page 22)
- a table column (see ***PeriSQL Columns*** on page 23)

You can select columns from more than one table. See ***Selecting Multiple Columns (Join)*** on page 26.

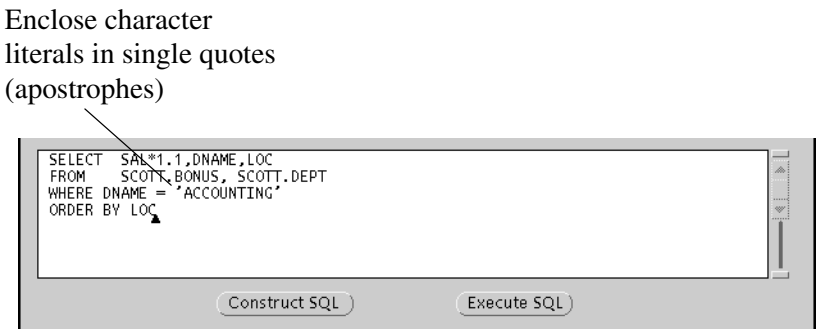
Select Construct SQL to build an SQL command based on the highlighted scrolling list entries. PeriSQL inserts the SQL keywords required to specify the query criteria.

PeriSQL places the SQL command text in the SQL scrolling list.



You can modify the SQL command manually within the SQL scrolling list. Position the cursor at the desired character and use the keyboard to modify the command. PeriSQL accepts valid SQL syntax and keywords.

For example:



If you select Construct SQL after you modify the statement in the SQL scrolling list, PeriSQL prompts you before it builds the SELECT statement based on your current selections. Select Continue to overwrite the current statement based on your selections or Cancel to retain the current (that is, modified) statement.

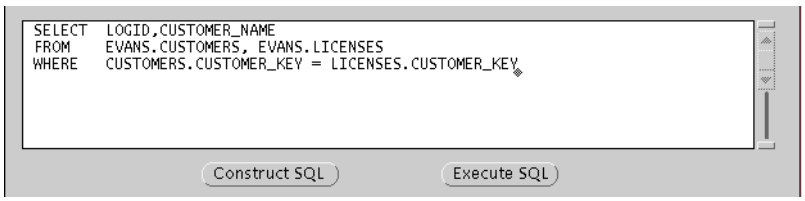
Selecting Multiple Columns (Join)

If you select columns from more than one table, PeriSQL performs a join operation. A join associates columns common to two or more tables.

To indicate a join operation in the SELECT statement, PeriSQL:

- lists the selected tables in the FROM clause.
- specifies the relationship between the tables in the WHERE clause.

For example:



The WHERE clause is based on columns that are common to two or more tables in the query.

PeriSQL automatically builds up to four joins from the currently displayed tables. If you need to constrain the query further, modify the SQL statement manually within the SQL scrolling list (see ***Creating and Customizing the SQL Command in PeriSQL*** on page 25).

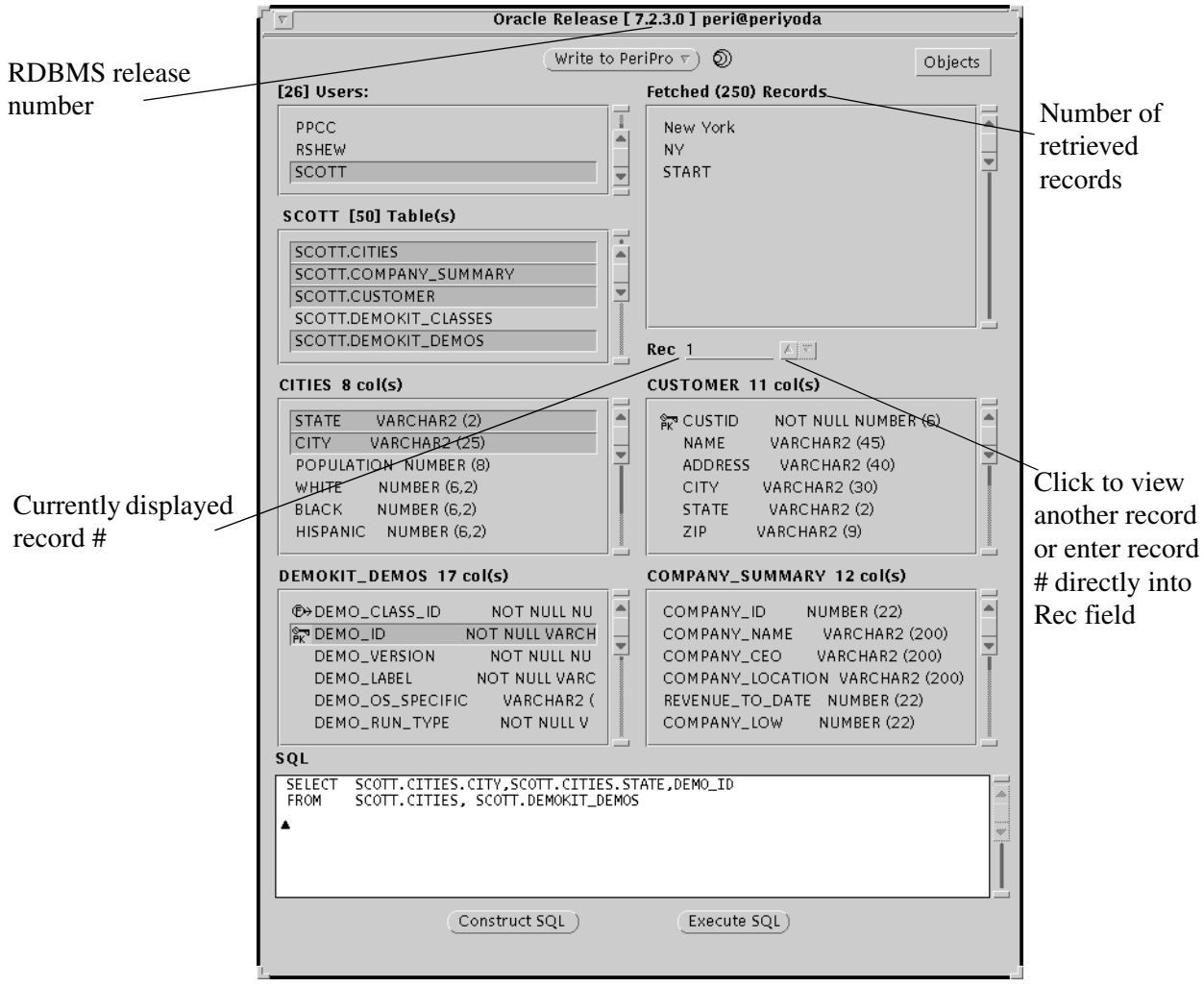
Performing a Query With PeriSQL

To query the database using the SQL command in the SQL scrolling list, select Execute SQL.

Execute SQL performs the following:

1. PeriSQL sends the SQL statement to the SQL server.
2. The SQL server prepares and parses the statement, and opens all database resources required to execute the SQL statement.

If any records match the query, PeriSQL displays the first returned record in the Fetched Records scrolling list.

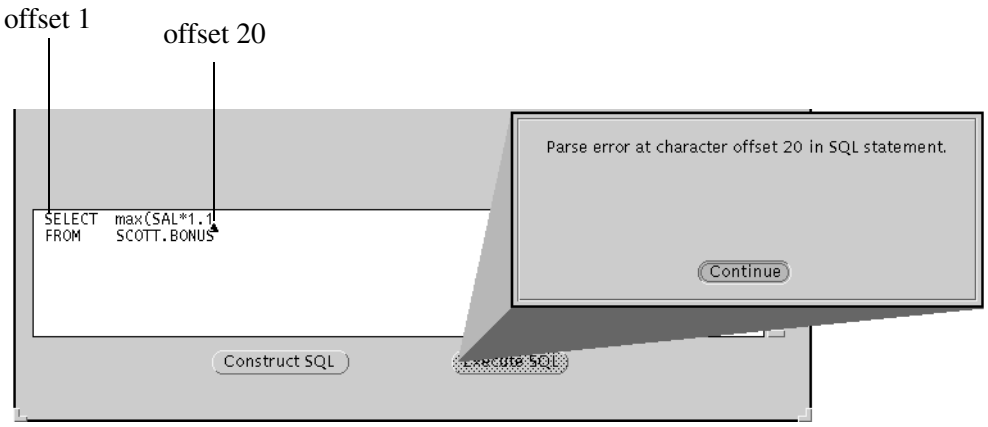


Each line entry in the Fetched Records list represents a column from the SQL SELECT list. PeriSQL can only display one record at a time.

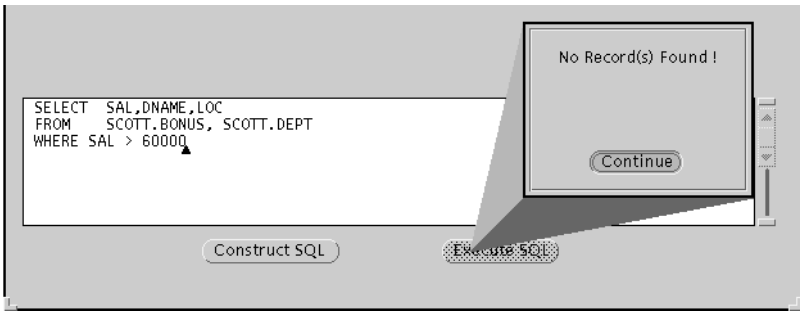
Debugging the SQL Command in PeriSQL

If PeriSQL cannot successfully execute the SELECT command, it provides an error message to indicate a logic or syntax error.

A parse error indicates a syntax error in the SELECT statement. PeriSQL indicates the location of the syntax error. For example:



A"no data" message indicates that the query did not retrieve any data. The query successfully executed, but no data matched the query. For example:



Reported Issues

PeriSQL does not support Oracle reference cursors.

Using Stored Procedures, Functions, and Triggers

You can use PeriSQL to display templates of Procedures, Functions, and Triggers defined for each user (see ***Displaying Predefined Procedures, Functions, and Triggers*** on page 29). You can also use PeriSQL to write Procedure and Function declarations to an SQL application (see ***Implementing Procedures and Functions*** on page 31).

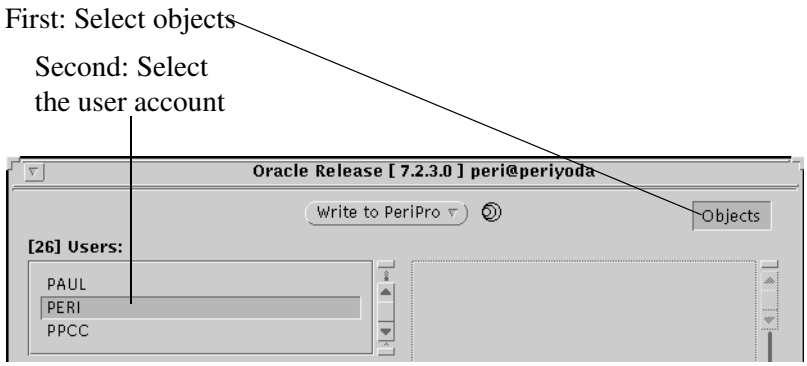
You cannot use PeriSQL to execute Procedures, Functions, or Triggers.

You cannot use PeriSQL to define Procedures, Functions, or Triggers. Your System Administrator, Database Administrator, or database developer must predefine these objects.

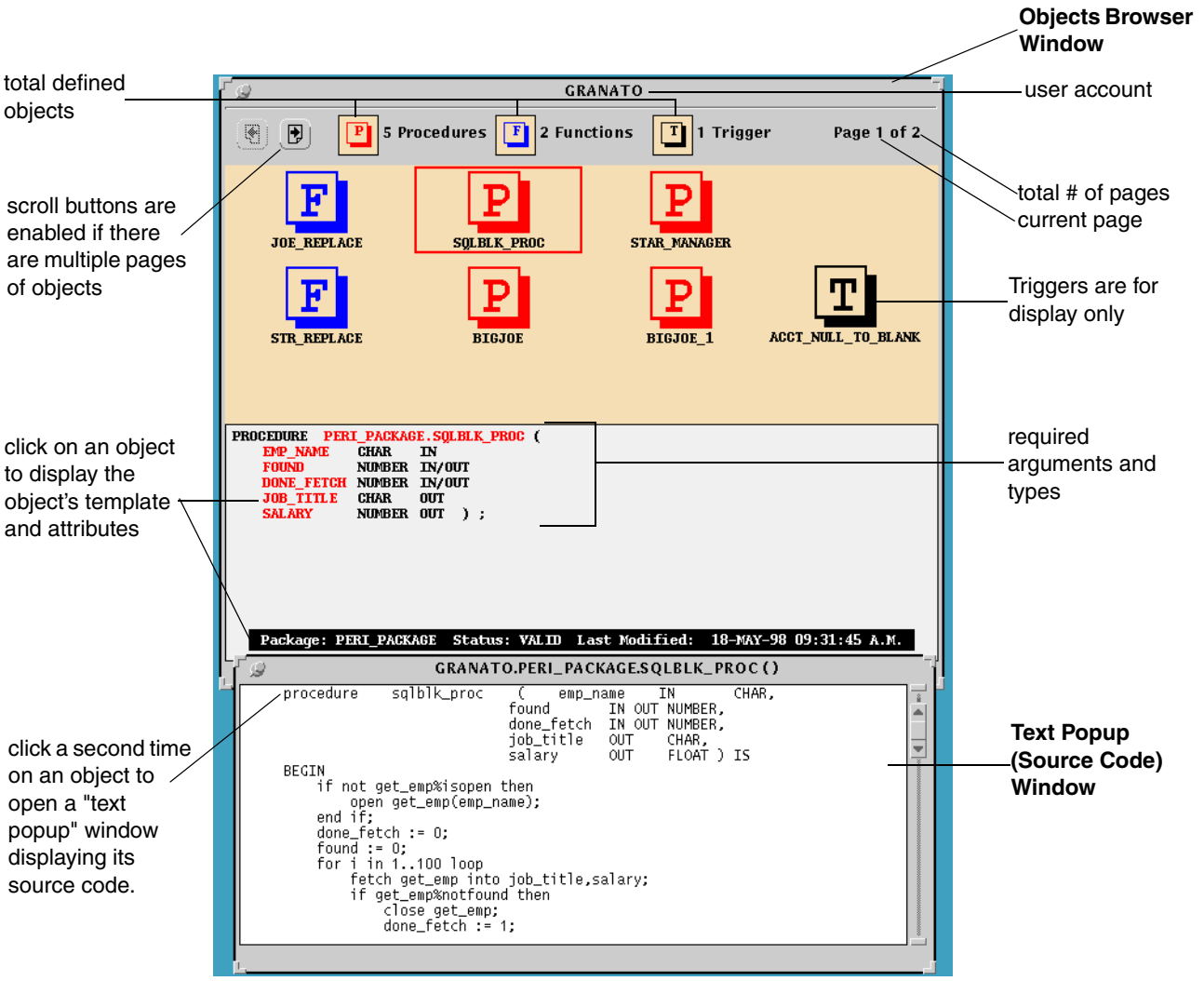
Displaying Predefined Procedures, Functions, and Triggers

To display predefined objects, first select Objects and then select the user account.

This feature is not currently available for use with an ODBC RDBMS.



If you select a user account that has predefined Procedures, Functions, or Triggers, PeriSQL launches a separate "Objects Browser" window displaying the templates of these objects. To display the predefined objects for another user account in a separate "Objects Browser" window, select another user account.



In the Objects Browser window, the heading in the top sub-window indicates the User Name, the number of Procedures, Functions, and Triggers defined for the account and the number of "pages" required to view all templates for the account. Left and right scrolling buttons to move between multiple pages of objects are located in the upper left corner.

Moving the cursor over an object causes information about the object to display in the lower sub-window, including its "Package" name (if any), its Status (Valid/Invalid), and its Last Modified Date/Time.

Implementing Procedures and Functions

To implement a Procedure or Function in an application, you must include the object's declaration in an SQL block in the application and supply variables for any required arguments.

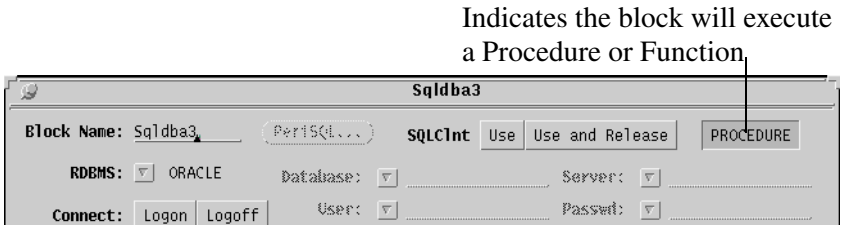
PeriSQL includes Triggers for display only. You cannot use PeriSQL to add a Trigger to an application.

Writing Procedures and Functions to an Application

You can use PeriSQL and an Objects Browser to write Procedures and Functions directly to an SQL application.

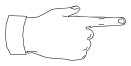
How to ...Write Procedures and Functions to an Application

1. **In the SQL block, select PROCEDURE**.

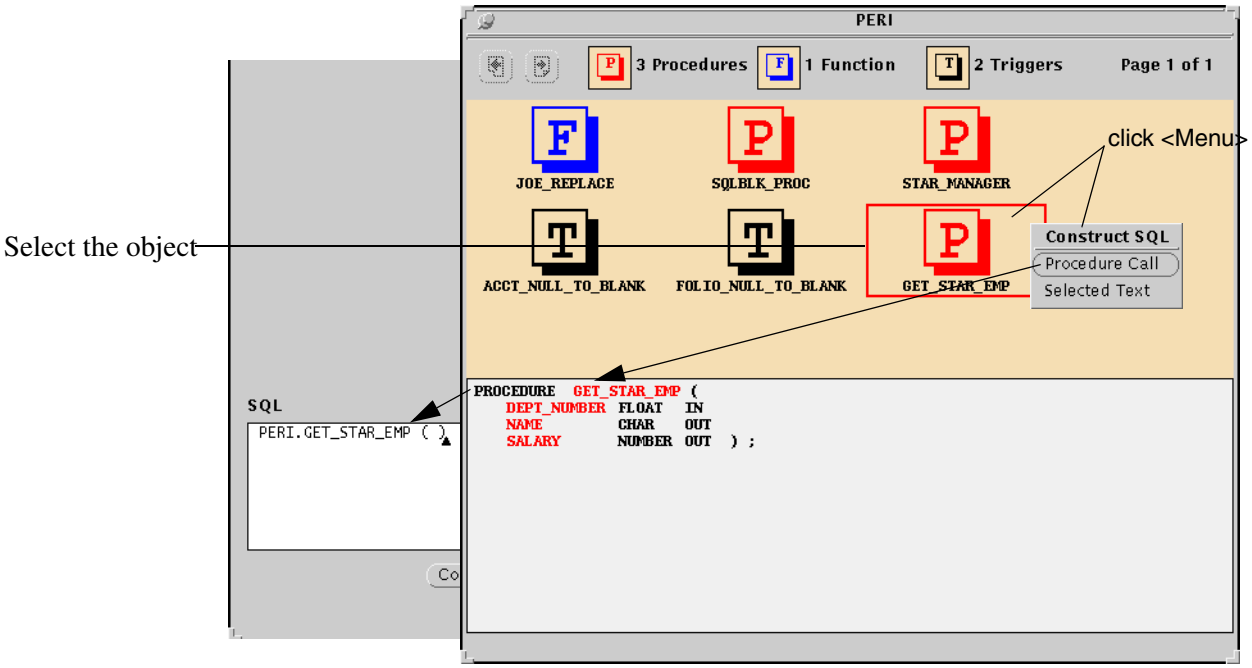


2. **In the PeriSQL Objects Browser, click** <SELECT> **on the desired Procedure or Function.**

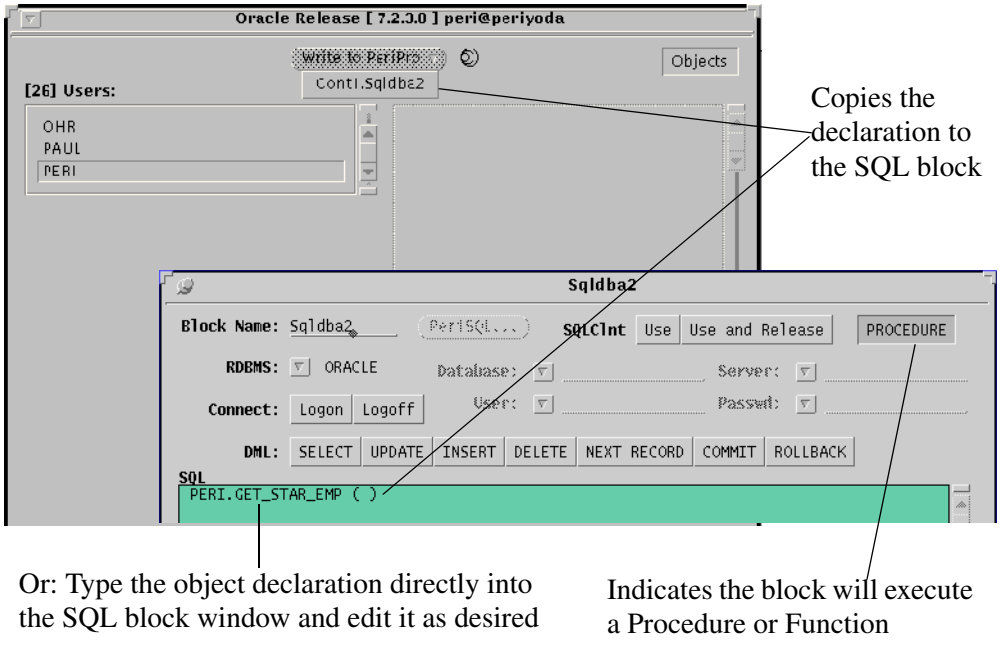
3. **Click** <MENU> **on the selected object to open the Construct SQL menu.** Select Procedure Call (or Function Call if object is a Function) and PeriSQL copies the object declaration to the PeriSQL window.



If text is selected (highlighted) in a source code window, choosing Selected Text from the Construct SQL menu copies the text to the PeriSQL window.



4. **From the PeriSQL Write to PeriPro menu, select the SQL block to write to.** PeriSQL copies the contents of the SQL window, which can be an edited object declaration, to the SQL block window.

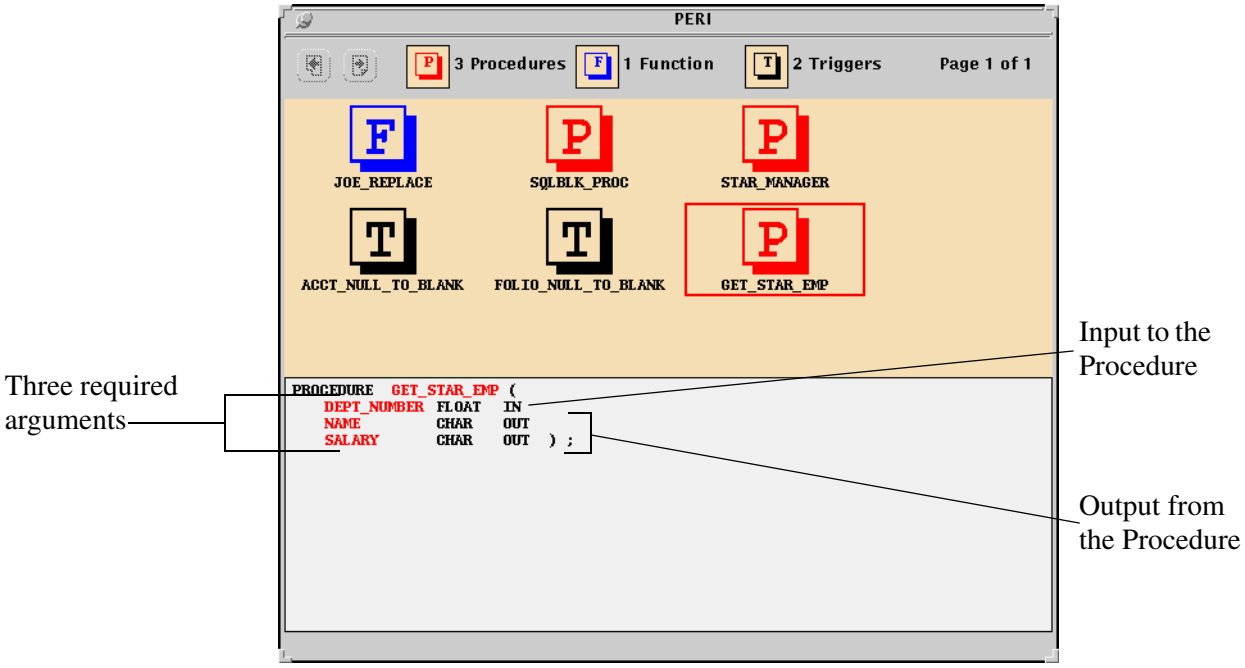


Supplying Arguments to Functions and Procedures

You can display the template for a Procedure or Function to determine the required arguments and types. You must specify data cards or constants for required arguments in the object declaration. You can edit a Procedure or Function in either PeriSQL's SQL window and/or PeriPro's SQL block (after selecting the Write to PeriPro menu in PeriSQL).

- IN designates an argument passed from the application to the RDBMS
- OUT designates an argument returned to the application
- IN/OUT designates an argument that both passes data to the RDBMS and returns data to the application

For example, the following implementation of the Procedure GET_STAR_EMP requires a floating point number as input and returns character strings:

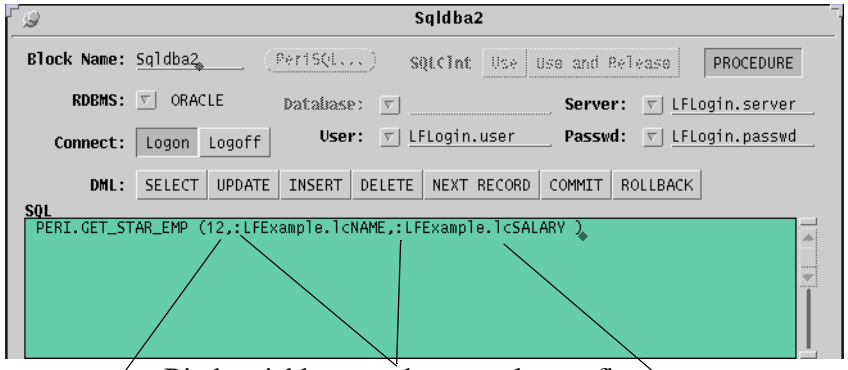


All Functions return a value. You must always specify a character data card to receive the return value.

Supplying Arguments in the SQL Block Window

After you transfer the object declaration to the application, you can either enter the arguments manually, and/or use the SQL Pane menu options.

For example:



Bind variables must have a colon prefix

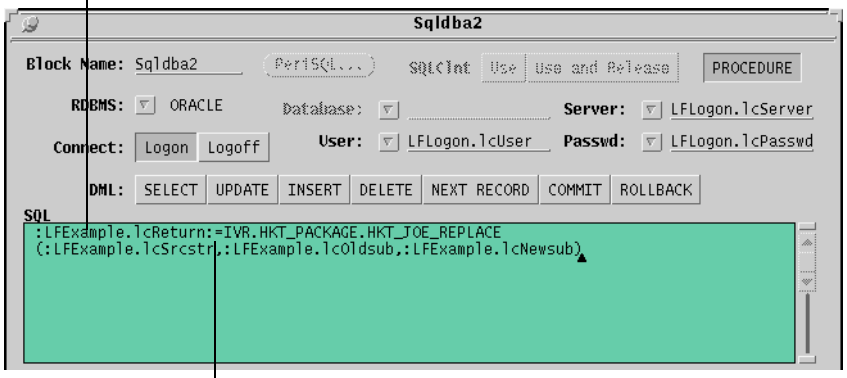
Separate arguments with commas

Use the full (folder datacard) name

For a Procedure or Function, you must specify a numeric data card to receive the return value.

For example:

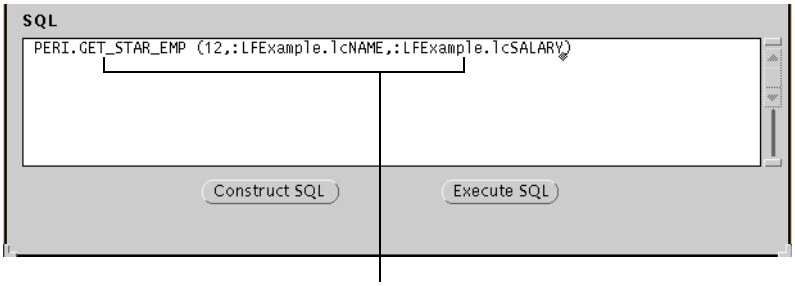
Variable to receive the return value



Oracle: Must enter := to indicate the assignment
Sybase (Procedures only): No parentheses around arguments and use = to indicate the assignment

Supplying Arguments in PeriSQL

You can manually enter the arguments in the object declaration before you write the declaration to the application. You can use the Write to PeriPro menu to copy the declaration and argument to the application (see ***Writing Procedures and Functions to an Application*** on page 31).



Enter the arguments before writing the object to the application

Sybase Stored Procedures

The following summarizes differences in the implementation of Sybase Stored Procedures from that of Oracle Stored Procedures.

- Sybase objects include only Procedures and Triggers (in Sybase, there are no Functions).
- A Sybase Procedure can have only IN and OUT arguments (no IN/OUT arguments).
- In the SQL text window in the SQL block, to execute a Procedure, parentheses are not allowed around arguments.

Using PeriSQL With the SQL Block

You can launch PeriSQL from an SQL block action window to create, modify, and execute SQL SELECT commands through a graphical interface. Use this feature to create and test SELECT commands before you add them to the application.

For details about using PeriSQL, see ***Using PeriSQL to Query an RDBMS*** on page 25.

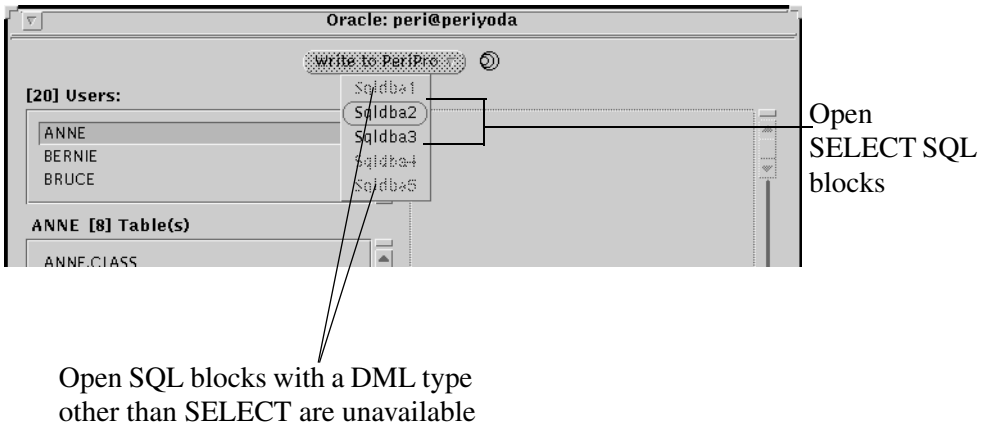
PeriSQL can write the constructed SQL command to any *open* SQL block window that has SELECT as its DML type. The SQL block action window must be open.

You must access PeriSQL from PeriProducer to use this feature. For information about accessing PeriSQL, see ***Accessing PeriSQL*** on page 17.

Writing the PeriSQL SELECT to an SQL Block

First, construct the SELECT statement in PeriSQL (see ***Using PeriSQL to Query an RDBMS*** on page 25).

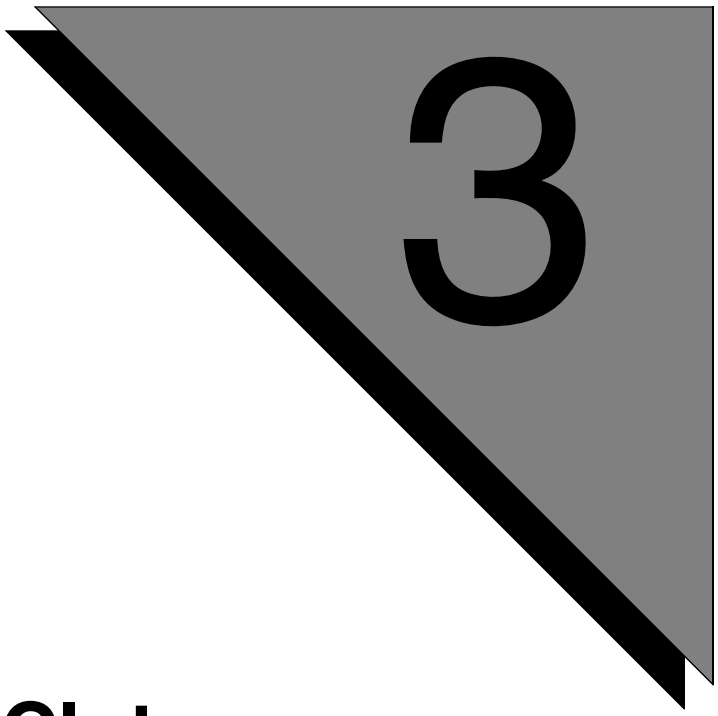
Next, in the PeriSQL window, click <MENU> on Write to PeriPro. From the pull down menu, select the SQL block to write to. PeriSQL can write the SQL command directly to any *open* SQL block that has SELECT as its DML type.



You can also use Write to PeriPro to write a Procedure or Function to an SQL block. See ***Using Stored Procedures, Functions, and Triggers*** on page 28.

You may have to manually add database and user qualifiers into a SELECT block if the database you used in PeriSQL differs from the one in SELECT block.

You can leave PeriSQL active for the entire current PeriProducer session. That is, you can iconize PeriSQL, load applications, add or delete SQL blocks, etc. PeriSQL dynamically updates the Write to PeriPro menu to reflect the current application.



SQLCInt

This chapter covers:

1. **Accelerating RDBMS Access With SQLCInt**
2. **The Cryptutil utility**
3. **Instructions to install Oracle Client 8.1.7 on an IBM 335**

Accelerating RDBMS Access With SQLClnt

You can accelerate RDBMS requests by coding the application to use a dedicated SQL client (**sqlclnt**). Refer to page 13 for valid database configurations.

Using an SQL client can reduce traffic directed to an RDBMS server because each SQL client can maintain an open connection to the RDBMS server. Applications can use an SQL client connection and then release the SQL client for another application.

Installing PeriRDB installs SQLClnt.

For more information, see the *Installing MPS Software on a Solaris Platform* or *Installing MPS Software on an NT Platform* book.

Limitations For SQLClnt

Executing a Resume connector following receipt of an SQL exception/condition (**sqlerr**, etc.) in an attempt to resume execution at the SQL block for which the condition occurred produces unpredictable results. For additional information about the Resume connector, see the *PeriProducer User Guide*.

SQLClnt is ***not*** currently supported on Windows NT.

Configuring For SQLClnt

Before an application can use an SQLClnt, both the **periq** and the **sqlclnt** daemons must be running.

Start the **periq** daemon before the **sqlclnt** daemon.

Typically, systems use configuration files to start required instances of these daemons. See the **periq** and **sqlclnt** man pages for a description of the available command line options. The most commonly used options are used as examples in this document.

Using the SQL Request Accelerator

To use an SQLClnt for an RDBMS request, select Use or Use and Release in the SQL block window. If Use is specified, an **sqlclnt** is reserved for the current application (after first being acquired, if necessary) and released only when a Use and Release is subsequently specified in an SQL block (the release is automatic if the application restarts or aborts). If Use and Release is specified, the **sqlclnt** is released (for use by other applications) after the SQL block has executed.

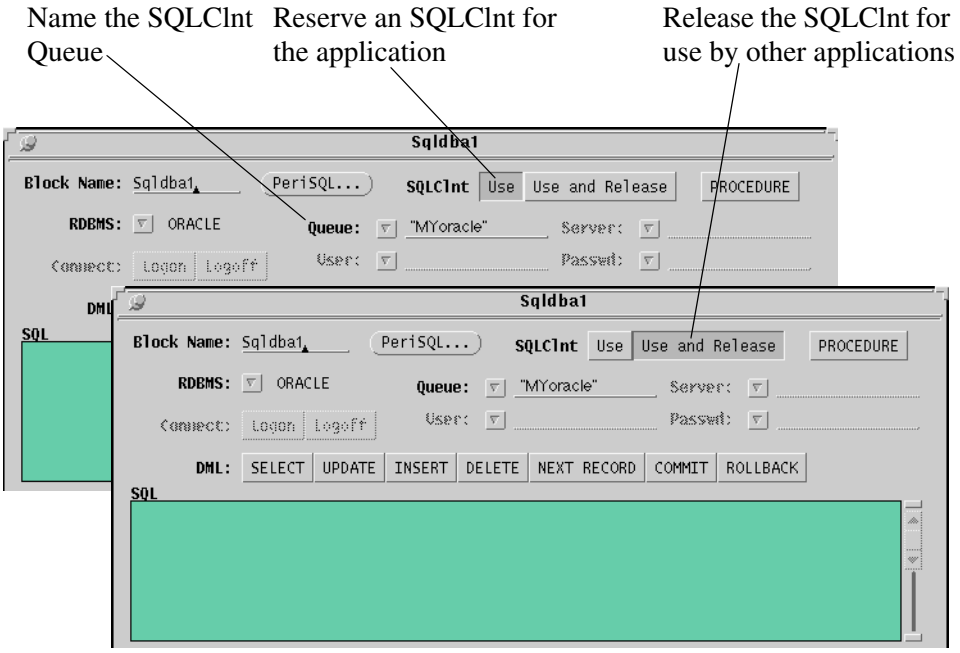
After an SQL block specifies Use, every SQL block that needs to utilize the "reserved" **sqlclnt**, must also specify the Use (or Use and Release) option.

Under Queue, enter a queue name (optional) to associate this SQL block with a specific SQLClnt.

The following is an example of how to start an SQLClnt:

```
sqlclnt -v 254 -s 230 -m oracle -q MYoracle -c
```

To use the previous SQLClnt, the queue name **`MYoracle`** would have to be entered into the Queue field of the SQL block, and the RDBMS type **`oracle`** would have to be selected in the RDBMS field of the SQL block.



When using an SQLClnt (selecting Use or Use and Release) the `Connect:` buttons Logon and Logoff are disabled. The application does not log on or log off the RDBMS server; SQLClnt performs all the necessary logons and logoffs.

SQLClnt stores the number of retrieved records found for a Select statement in the SQL_Info.RdbmsMsg data card. Users can assign this number to a Number data card using the To Number operator in a Compute Block.

Typically, systems use configuration files to start required instances of these daemons. See the *MPS Command Reference Manual* (P0602476) for a description of the available command line options. The most commonly used options are used as examples in this document.

Using the SQLClnt Backup Server (-s option)

If the primary database (contacted when you use the **`-u`** suffix) can not be reached (due to network problems, database shutdown, and so on), then use the secondary database by adding the -S suffix.

Once SQLClnt connects to the secondary database server, it does not revert back to the primary database server unless SQLClnt is restarted or if the connection to the

secondary server goes down.

If you want to use an encrypted connect string, use option **-b**. Encrypt the connect string by using the Cryptuti utility.

Timing, Measuring, and Logging RDBMS Server Performance

A new command line option, sqlclnt -l, logs the longest duration of any transaction sent to the RDBMS server for which it received responses. As part of the command to start SQLClnt, users must specify the directory path into which to place the log file.

For example, if SQLClnt is started by the following command:

```
sqlclnt -v 254 -s 230 -m oracle -u usr/passwd@vador -l /tmp & -c
```

then a file called **sqlclnt-vps254-230.log** will be created in the /tmp directory.

Cryptutil Utility

The `Cryptutil` utility is used to encrypt the RDBMS connect strings. This utility encrypts the given RDBMS connect strings and prints it to the standard output. The encrypted RDBMS connect string is specified at the beginning of the `SQLClnt`. The `SQLClnt` decrypts the connect string and uses it to connect to the database.

The `Cryptutil` utility does not validate the given connect string i.e., it does not validate if the given string is a valid RDBMS connect string. You must copy the encrypted string and use the same with the `SQLClnt`.

Using the Cryptutil Utility

The `Cryptutil` utility is located at the same location as the `SQLClnt` and `PERISql` executable. For example, `/opt/vps/PERIrdb/bin`

You do not need to set any environment variable to use the `Cryptutil` utility.

Syntax

```
Cryptutil <string>
```

This utility prints the encrypted RDBMS connect string and the original connect string to the standard output. A sample output is shown below:

```
cryptutil scott/tiger@ORCL
Original String: scott/tiger@ORCL
Crypted String: Mmvn5bdiuqqi5OZvomTTzkCyEbR6yFRcqDo3rw==
```

Using the Encrypted Connect String with `SQLClnt`

New command line options have been added to the `SQLClnt`, namely `U` and `B`.

- U—This option is used to denote an Encrypted RDBMS Connect String
- B—This option is used to denote an Encrypted RDBMS Connect String for a Backup/Fail-Over RDBMS server.

Using Option U

An example of using the SQLClnt with option U is given below:

```
"sqlclnt -v 2 -s 221 -m oracle -U
uiYLCVuOUkLOyMpDjkj/4myePZhW5HhwhBYbgw== -1 /tmp/sqlclntlog -c"
```

The U option is followed by the encrypted RDBMS connect string which is generated by the Cryptutil. The SQLClnt decrypts this string and connects to the RDBMS. The options U and u cannot be specified together as there can only be one primary database.

Using Option B

The encrypted RDBMS connect strings can be used with the Backup/Fail-Over database as well as the primary database. The example for the same is given below:

```
"sqlclnt -v 254 -s 221 -m oracle -U
uiYLCVuOUkLOyMpDjkj/4myePZhW5HhwhBYbgw==-B
uiYLCVuOUkLOyMpDjkj/4myePZhW5HhwhBYbgw== -1
/tmp/sqlclntlog & -c"
```

Option B is followed by an encrypted RDBMS Connect string. Unlike option U, there can be more than one option B specified when starting a SQLClnt as there can be more than one backup/failover server.

Using encrypted Connect Strings with gen.cfg

For starting the SQLClnt from gen.cfg, the procedure mentioned in the "Using the Encrypted Connect String with SQLClnt" on page 41 holds good. A sample entry in the gen.cfg for a SQLClnt with encrypted RDBMS connect string is given below.

```
"sqlclnt - 0 0 "sqlclnt v 2 -s 221  -m oracle -U
uiYLCVuOUkLOyMpDjkj/4myePZhW5HhwhBYbgw== -l
/tmp/sqlclntlog -c""
```

Accessing Databases using SQLClnt on an Intermediate Node

SQLClnt usually runs on the same node as the IVR application. You can also run SQLClnt on an intermediate node. Using an intermediate node centralizes the database client software while using SQLClnt to accelerate access to the database.

The configuration is highly scalable. You can install a number of nodes, each of them running multiple instances of an application coupled with a group of nodes in which multiple instances of SQLClnt are running. When SQLClnt runs on the intermediate node, you must also install the database client on the intermediate node.

Use one of the following configurations when installing SQLClnt and related processes.

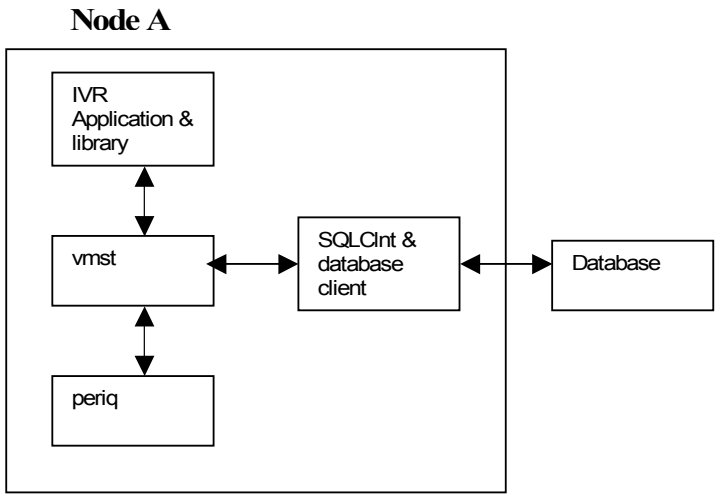
- Typical installation with SQLClnt and related processes installed on the same node as the application.
- SQLClnt on an intermediate node but related processes are on the same node.
- SQLClnt and **`vmst`** on an intermediate node.
- SQLClnt and **`periq`** on an intermediate node.

The IVR application uses the `libvagsqlclnt.so` library.

The IVR application uses the `vagsqlclnt.dll` library.

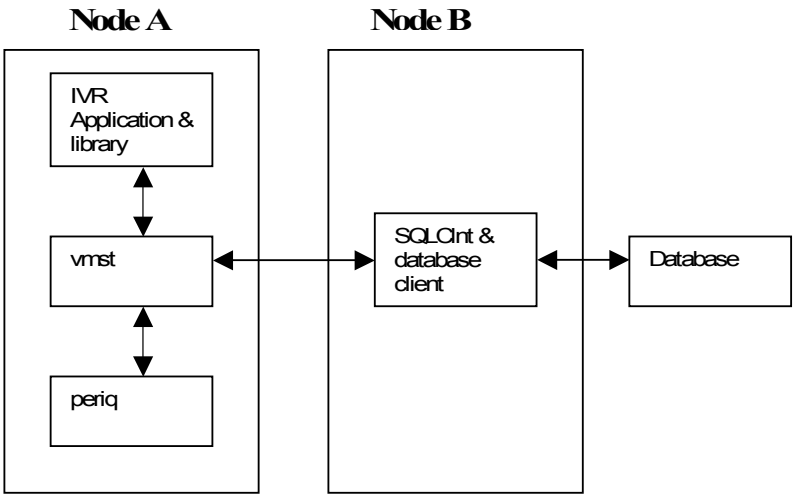
SQLClnt on the Same Node as the IVR Application

The following diagram shows a typical configuration where SQLClnt and the application are installed on the same node.



SQLClnt on an Intermediate Node

The following diagram shows SQLClnt on an intermediate node but related processes on the same node with the IVR application.



After you have installed SQLClnt and the related processes, configure the nodes.

1. Run the following commands on Node A.

   a. vmst -v 1

   Set Vmst 1 to run on this node.

   b. periq -v 1 -s 16

   Start periq and connect to vmst number 1 running on this host, using port 16. Port 16 is the default for periq and is configured in $ASEHOME/etc/services.

2. Run the following command on Node B.

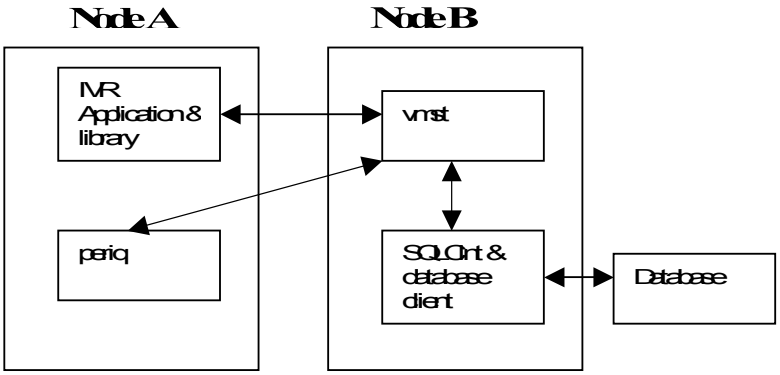
   sqlclnt -v 1 -s 230 -N NodeA -u ndb/peri@database -m oracle -q oracleq10 -P 16

   Start SQLClnt and connect to vmst 1 running on NodeA and using port 230. Port 230 is one of many available to sqlclnt and is configured in $ASEHOME/etc/services.
   - The unencrypted connection string to the database is ndb/peri@database.
   - The mode is Oracle.
   - SQLClnt is in the queue, oracleq10.
   - The communication with periq is through port 16.

This is the most efficient configuration because communication between **vmst** and the application or **periq** are local. Communication with SQLClnt takes place over the network.

SQLClnt and vmst on an Intermediate Node

The following diagram shows SQLClnt and **vmst** on an intermediate node with **periq** on the same node as the IVR application.



After you have installed SQLClnt and the related processes, configure the nodes.

1. Run the following command on Node A.

   a. periq -v NodeB:2 -s 16

   Start periq and connect to vmst 2 running on host Node B, using port 16. Port 16 is the default for periq and is configured in $ASEHOME/etc/services.

2. Run the following commands on Node B.

   a. vmst -v 2

   Run vmst 2 on this node.

   b. sqlclnt - v2 -s 230 -u sa/peri@database -m sybase -q sybaseq21 -P 16

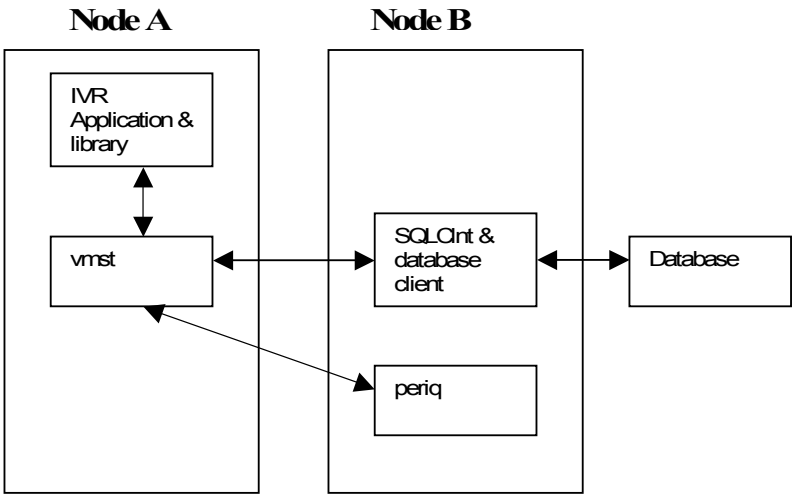
   Start SQLClnt and connect to vmst 2 running on this node using port 230.

   - Port 230 is one of many available to SQLClnt and is configured in $ASEHOME/etc/services.
   - The unencrypted connection string to the database is sa/peri@database.
   - The mode is Sybase.
   - SQLClnt is in the queue, sybaseq21.
   - The communication with periq is through port 16.

This configuration is detailed for information purposes. It is more efficient to run **vmst** on the same node as the IVR application.

SQLClnt and periq on an Intermediate Node

SQLClnt and **periq** on an intermediate node with **vmst** on the same node as the IVR application.



After you have installed SQLClnt and the related processes, configure the nodes.

1. Run the following command on Node A.

   a. vmst -v3

   Run vmst 3 on this node.

2. Run the following commands on Node B.

   a. periq -v NodeA:3 -s 16

   Start periq and connect to vmst number 3 running on host Node B, using port 16. Port 16 is the default for periq and is configured in $ASEHOME/etc/services..

   b. sqlclnt -v 3 -s 230 -N NodeA -u sa/peri@database -m odbc -q odbcq32 -P 16

   Start SQLClnt and connect to vmst 3 running on this node using port 230.

   - Port 230 is one of many available to SQLClnt and is configured in $ASEHOME/etc/services.
   - The unencrypted connection string to the database is sa/peri@database.
   - The mode is ODBC.
   - SQLClnt is in the queue, odbcq32.
   - The communication with periq is through port 16.

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CORBACInt

This chapter covers:

1. **Working with CORBA Server Objects**
2. **CORBACInt**
3. **The CORBA Block**

Working with CORBA Server Objects

PeriRDB version 1.2 supports integration with CORBA (Common Object Request Broker Architecture). The CORBA Block in PeriProducer accesses information in a CORBA server through **`CORBAClnt`**. The CORBAClnt daemon connects to a specified VMST, after which it connects and binds to an Object Request Broker (ORB). After these initial operations, CORBAClnt waits until it receives a CORBA request from an application CORBA block.

Installing PeriRDB installs SQLClnt.

For more information, see the *Installing MPS Software on a Solaris Platform* or *Installing MPS Software on an NT Platform* book.

CORBAClnt is currently ***not*** supported on Windows NT.

CORBAClnt

The information that an application developer enters in the CORBA block is used to build and send a request from the application to `corbaclnt`.

The **`corbaclnt`** uses the CORBA Dynamic Invocation Interface (DII) to invoke any method on any CORBA object using knowledge obtained at run-time from either a CORBA Interface Repository (IR) server or a CORBA "stringified" Internet Object Reference (IOR). The CORBA block in conjunction with corbaclnt is a dynamic, run-time invocation of CORBA services, not a static, precompiled invocation. The DII approach allows PeriPro applications to invoke operations on any CORBA registered object without having to link the client-side stubs that may have been generated for a particular object by an Object Request Broker (ORB) vendor's Interface Definition Language (IDL) compiler.

The Interface Repository mode functionality has not been implemented for this release.

Application requests are handled by `corbaclnt` on a first-in, first-out basis, and all application requests are managed in a queue. If increased parallelism is necessary, multiple `corbaclnt` processes can be started. The number of `corbaclnt` processes necessary is determined by the number of applications executing and the rate at which CORBA requests are made.

corbaclnt Usage Menu

The following options are available for CORBAClnt:

Name	Option meaning
-v #	mps number
-P port[1]	PeriQ port (default - any)
-m queue_type	'corba'
-q name[2]	CORBA Naming Service
-X {s|n}	debugging level
-r {dev|file}	redirect output
-H	help

1. Use of PeriQ (see - P, -q option above), in conjunction with corbaclnt is not currently implemented.
2. Use of PeriQ (see - P, -q option above), in conjunction with corbaclnt is not currently implemented.

Installation/Startup of corbaclnt on Solaris

To interface with a CORBA server (on Solaris), there must be an entry in the `$ASE-HOME/etc/services` file specifying valid port(s) for *corbaclnt*. For example:

```
# CORBA daemon
#
corbaclnt        231-239
```

The following should generally be affected during system startup (example line and port numbers shown):

```
vms -V254 &
corbaclnt -v 254 -s231 &
```

CORBAClnt is currently ***not*** supported on Windows NT.

CORBAClnt Server Report

For an instance of `corbaclnt`, the following shows an example of how to use the AMU command to display the elapsed time of all invoked methods:

```
amu -v 131 -s 242 -c "req st"
```

Note that *vengine*'s output must first have been redirected to a file or to the screen.

To prevent problems caused by a modem connection loss, *amu* redirection to a device (req redirect /dev/...) only works if this functionality has been enabled by setting the variable AmuRedir to "tty" in the $ASEHOME/etc/ase.conf file.

Reported Issues

corbaclnt is blocked on a request to the CORBA server, and if the server does not respond, due to a network, server crash or infinite loop on the server side, that corbaclnt gets frozen and there will be a permanent deny of services from corbaclnt, until it is terminated and restarted. This is a known problem with no re-design or threaded implementation planned.

If a request for resource comes from an application to **periq**, and the service is not registered, then currently periq does not return any response to the corresponding application (vrto).

This issue pertains to MPS RDB systems (Solaris only) that interface with a CORBA server. If Periq is restarted using the commands:

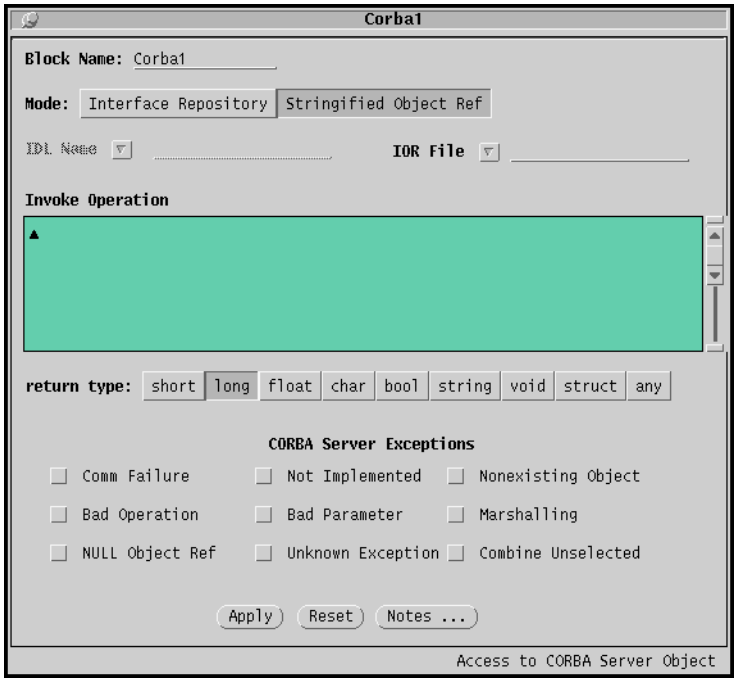
```
srp periq -stop
srp periq -start
```

while applications are running, vrto occurs. After this event, applications cannot execute CORBA requests.

To correct this issue, restart the CORBA servers.

The CORBA Block

The information that an application developer enters in the CORBA Block is used to build and send a request from the application to **corbaclnt**. Run-time implementation occurs through CORBAClnt, which allows invocation of and access to class objects hosted through a CORBA server.



The CORBA block has the following fields:

Name	Meaning
Mode	Specifies whether the object named in this block will be handled using an IDL Name or an IOR File query. PeriRDB currently only supports the use of an IOR File query (Stringified Object Repository).
IOR File	The file that contains the stringified Internet Object Reference (IOR), that is, the absolute path of the file that contains a CORBA server's specific stringified class/object. A CORBA host server can generate a stringified object reference by using the object_to_string method of an OMG-compliant ORB. The IOR is used by the CORBAClnt to convert the string to an object reference handle. The object reference is used to invoke the operation on the CORBA object. A standard Folders menu is used to enter the IOR File field either as a Characters datacard or as a string literal.
Invoke Operation	This is where you specify operations to access a CORBA server. For more information, see ***Invoking Operations With the CORBA Block*** on page 53.
Return Type	Here the user must specify the data type for every parameter that will be returned by the operation. For more information on return types, see ***Specifying Return Types*** on page 54.

Name	Meaning
Exceptions	The CORBA block recognizes a set of CORBA Server Exceptions that the user can handle. All Exceptions are always enabled (i.e. selectable). For more information on return exceptions, see ***Specifying Return Exceptions*** on page 55.

Invoking Operations With the CORBA Block

The operation to invoke is entered in free format. A folder or datacard can be specified to receive the return value, if any. Datacards and literals can be specified to pass application data as parameters to the operation. Each parameter must be identified as being *in* (sent to the server), *out* (returned from the server), or *inout* (both sent to and returned from the server).
The following is an example of the syntax required to invoke a CORBA server's method/operation:

```
:AnyFolder = getBestEmployee    (long   :folder.id in,
                                 string :folder.name inout,
                                 float  :folder.salary inout,
                                 long :folder.factor inout,
                                 string :folder.desc out)
```

The request invokes the getBestEmployee method of the named object, passes five parameters with the indicated types and usage taken from or stored to `folder.id`, `folder.name`, `folder.salary`, `folder.factor`, and `folder.desc`. The returned value is stored to folder `AnyFolder`. The datacards in AnyFolder must match in type, size, and name, the data returned from the server.

Returning the result to a folder instead of a datacard is valid only when the return type in the CORBA block is set to *any*. See ***Specifying Return Types*** on page 54.

The following rules apply to the entry of operations in the *Invoke Operation* textbox:

- Only one operation may be entered in a CORBA block's Invoke Operation textbox.
- When using the *Bind with Datanames* option of the hidden menu for the Invoke Operation window in the CORBA block to specify datacard names, each datacard name is automatically preceded by a colon (:). If entered manually, the entire datacard name including the parent folder(s) and the preceding colon must be typed.
- The list of parameter(s) passed to the CORBA server in the Invoke Operation statement must be enclosed within parentheses. Every parameter must be either a **Characters** datacard, a folder, or for *in* parameters only a Numeric literal or a Character literal enclosed within apostrophe. A boolean value should be passed as a Character "1" for "True", "0" for "False". If there are no parameters, the open and close parentheses must be included, for example: `result = methodname ()`
- An Array element cannot be passed to or returned from the Server.
- A subfolder cannot be passed to or returned from the Server.
- A hash (#) symbol at the start of a text line in the Invoke Operation window comments out that line.

- PeriPro creates the *vagorb* and *corba* folders in the Global Data Folders window for use during its interaction with *corbaclnt*. The folders are created when the developer adds the first CORBA block specifying a valid Invoke Operation. Users should not alter the contents of these folders.
- The only timeout condition currently applicable to execution of a CORBA block is *vrto*. The timer can be set in an Environment block using the option *vpsrcvtime* in the "Vengine" Class. This corresponds to *vengine* command line option - *M*.

Specifying Return Types

The user must specify the data type for every parameter which will be returned by the operation.

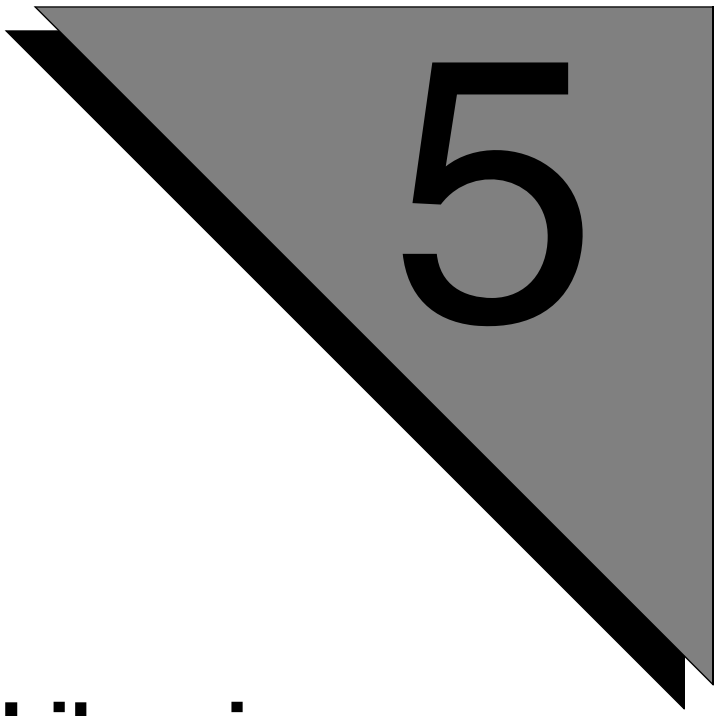
The following table shows the primitive data types that are supported and any special instructions to follow when specifying the return types. A "Return" datacard cannot be an array element.

Name	Meaning
short	Specify a Characters datacard. A return type *char* indicates that the parameter is one byte in length.
long	Specify a Characters datacard. A return type *char* indicates that the parameter is one byte in length.
float	Specify a Characters datacard. A return type *char* indicates that the parameter is one byte in length.
char	Specify a Characters datacard. A return type *char* indicates that the parameter is one byte in length.
boolean	Specify a Characters datacard. A return type *char* indicates that the parameter is one byte in length.
string	Specify a Characters datacard. A return type *char* indicates that the parameter is one byte in length.
void	Server does not return a result. For return type *void*, do not specify a target datacard. Precede the method name by the word "void", as in the following example: `void methodname (long folder.data-1 in)`
struct	Return type ***struct*** is not currently implemented.
any	For return type any, the datacards in the specified folder must be consistent with (in type, size, and data names) the data components returned by the method. The folder must be a non-empty "upper-level" (01) folder that does not contain any subfolder(s).

Specifying Return Exceptions

The following table shows the exceptions available with the CORBA block:

Condition name	CORBA Block exception case connector	CORBA Block name	Description
badoperation	BOP	Bad Operation	Thrown by server when a request is received for an operation that does not exist on the server.
badparameter	BP	Bad Parameter	An attempt was made to pass an unexpected parameter, or invalid data type, to the operation.
comfail	CF	Comm Failure	The connection through the IR/IOR was refused or is broken.
marshall	TMAR	Marshalling	The IDL specification is inconsistent with the IOR. For example, if the return type specified to be *float*, but server returned *long*.
nilobjref	NIL	Null Object Ref	Object not registered with CORBA Server.
notimpl	NI	Not Implemented	The requested object is not implemented.
nonexistobj	NEO	Nonexisting Object	Object does not exist.
orberr	UNK	Unknown Exception	User Thrown Exception
varies	ALL	Combined Unselected	All other CORBA Server / Operation Errors not explicitly specified.



PeriRDB Libraries

This chapter covers:

1. **The PeriRDB and SQLCInt Libraries**

PeriRDB Libraries

The following tables list each database with its associated library. The PeriRDB libraries are located in `$RDBHOME/lib`.

Database	Library
ORACLE	libvagoracle.so
SYBASE	libvagsybase.so
INFORMIX	libvaginformix.so
ODBC	libvagodbc.so
vengine/vmst/periq/SQLClnt interface	libvagsqlclnt.so

The following table lists the SQLClnt runtime shared libraries.

Database	Library
ORACLE	libsqlclntorc.so
SYBASE	libsqlclntsyb.so
ODBC	libsqlclntodbc.so
IPC Support Utilities (password hiding, recycling, and SQL support routines)	livsqlipc.so

The following table lists the PeriSQL runtime shared libraries.

Database	Library
ORACLE	libpsqloracle.so
SYBASE	libpsqlsybase.so

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